REMARKS

Applicants respectfully traverse and request reconsideration.

Amendments

Claim 47 has been amended as to form and is now presented in independent form. No new matter has been introduced in this amendment.

Claims Objections

Claim 47 stands objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 47 has been amended to include the limitations of claim 45, the only claim upon which claim 47 depends. Accordingly, claim 47 is believed to be in proper condition for allowance.

Claims Rejections

Claims 17 and 18 stand rejected under 365 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,397,343 to Williams et al. ("Williams"). Claims 12-13, 15-16, 34, 37, 39-40 and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,451,892 to Bailey ("Bailey") in view of Williams. Claim 19 stands rejected as being unpatentable under 35 U.S.C. § 103(a) as being unpatentable over Williams in view of Bailey. Claims 38, 43 and 44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bailey in view of Williams and U.S. Patent No. 6,889,332 to Helms et al. Claim 41 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bailey in view of Williams and U.S. Patent Publication No. 2003/0229816 to Meynard ("Meynard"). Claims 45 and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bailey in view of Williams and Meynard.

Claim 17

Williams is cited by the Office Action as teaching each and every limitation of Applicants' claim 17. Applicants respectfully disagree. Claim 17 is directed to method for generating a clock signal for a graphics co-processor in a system that comprises a host processor and the graphics co-processor. The method includes, among other things, "providing, by a thermal sensor control circuit coupled to the thermal sensor, an interrupt control signal and temperature data in response to the temperature signal" and "causing, by the host processor coupled to the thermal sensor circuit and in response to the interrupt control signal and the temperature data, an increase in the operating frequency of the clock signal above the nominal operating frequency, when the detected junction temperature is below the maximum rated temperature." (Emphasis Added). Neither of these limitations is taught by Williams.

Williams is directed to a clock adjust device 100 (also referred to in Williams as a clock controller 100) for dynamic graphics subsystem clock adjustment within a computer system having a CPU and a dedicated graphics subsystem. (Col. 4, ll. 12-16; Col. 6, ll. 12-16; FIGs. 1-3). The clock adjust device 100 includes a clock pulse generator 101, a controller 102 and a system interface 103. (Col. 4, ll. 12-28; Col. 16, ll. 12-34; FIG. 1). System interface 103 is coupled to receive various inputs from the graphics subsystem and the computer system. (Col. 4, ll. 22-24). For example, system interface 103 receives an indication on the load on the graphics subsystem. (Col. 6, ll.33-44). Controller 102 is coupled to receive system interface's 103 received inputs (e.g., the load of the graphics subsystem). (*Id.*). In one embodiment, controller 102 is configured to receive temperature information of the graphics subsystem from a temperature sensor 302 (presumably along input line 105 of FIG. 1). (*Id.*, Col. 4, ll. 20-47; Col. 9, ll. 12-26; FIG. 3). Controller 102 is coupled to the clock pulse generator 101 which generates

the clock frequency output 104. (Col. 4, ll. 14-16). Controller 102 adjusts the generated clock frequency output 104 over a range based on the heat of the graphics subsystem or other associated output levels (e.g., the load on the graphics subsystem). (Col. 4, ll. 20-28, 38-47; Col. 7, ll. 13-19; Col. 9, ll.22-26).

In considering the claimed "providing, by a thermal sensor control circuit coupled to the thermal sensor, an interrupt control signal and temperature data in response to the temperature data" the Office Action equated the claimed thermal sensor circuit to Williams' clock adjust device 100, directed Applicants to FIG. 3 (presumably, the optional temp sensor 302 thereof) with respect to the claimed thermal sensor, equated the claimed interrupt control signal to Williams' generated clock frequency output 104, equated the claimed temperature data to Williams' "heat information from temperature sensor" and cited Williams, Column 9, lines 9-26 and Col. 10, lines 40-48 as teaching that the claimed provision is in response to the temperature signal. (Page 3). This rejection is improper.

Initially, Applicants note that the claimed interrupt control signal is not the same "thing" as a generated clock frequency output 104. The claimed interrupt control signal is, as claimed, a "control" signal and not a clock frequency output generated by a clock adjust device such as clock adjust device 100. This distinction is supported by the body of claim 17 where Applicants claim, as part of the same method, "causing, by the host processor … in response to the interrupt control signal and the temperature data, an increase in the operating frequency of the clock signal …." (Emphasis added). Thus, in Applicants' claim 17, the host processor increases an operating frequency of a clock signal at least in response to the interrupt control signal. This distinction is further acknowledged by the Office Action itself where the Examiner appears to equate the claimed clock signal to Williams' generated clock frequency output 104 (page 3). Therefore, a

clock frequency output signal is different than an interrupt control signal. For at least the reason that the claimed interrupt control signal is not a generated clock frequency output 104, the rejection must be withdrawn.

Further, however, the rejection also errs in suggesting the Williams clock adjust device 100 is capable of providing temperature data. In fact, the heat information from temperature sensor 302 of FIG. 3 is not an output of the clock adjust device 100 but is rather an *input* to the clock adjust device 100. As discussed above, it appears that Williams' controller 102, in one embodiment, processes load and temperature information as received along inputs 105 and/or 106 to determine whether graphics subsystem has exceeded its thermal limits. Applicants are unable to find any teaching in Williams that teaches the Office Action's suggestion; i.e., that the clock adjust device 100 provides the temperature data from the temperature sensor 302. Applicants further note that the Office Action does not provide a citation to a specific column and line number in Williams that allegedly teaches this suggestion.

Further supporting Applicants' contention that the William's clock adjust device 100 does not provide temperature data, Applicants note that the Office Action appears to correctly recognize that the clock adjust device 100 is capable of receiving heat information from temperature sensor 302. For instance, the Office Action cites Col. 9, lines 9-26 and Col. 10, lines 40-48 for the proposition that Williams' clock adjust device 100 is responsive to a temperature signal. Thus, the Office Action itself recognizes that Williams' clock adjust device 100 appears to receive temperature information from a sensor and does not appear to provide temperature data.

Thus, because Williams' clock adjust device 100 also does not provide temperature data, the rejection is improper.

Lastly and with respect to the claimed "causing, by the host processor …, an increase in the operating frequency of the clock signal …", Applicants note that Williams uses a clock adjust device 100, and not a host processor, to increase the operating frequency of a clock signal. The mere fact that a host processor is "inherently present" as suggested by the Examiner is not sufficient to anticipate claim 17 because the inherently present host processor in Williams does not appear to be capable of increasing the operating frequency of the clock signal. Instead, Williams teaches the use of clock adjust device 100 and not a host processor for generating and adjusting of a clock frequency output 104. In fact, in at least one embodiment, the clock adjust device 100 is part of the graphics subsystem 200. (*See e.g.,* FIG. 2A and FIG. 2B). While the clock adjust device 100 is shown in FIG. 3 as being external to the graphics subsystem 300, the Office Action does not cite to any portion of Williams that states that the clock adjust device 104 is a host processor. To the contrary, the two appear to be different circuits in the system.

For each of the above reasons, claim 17 appears to be in proper condition for allowance.

Claims 12 and 34

Claim 12 is directed to a clock control system for generating a clock signal having an operating frequency set to a nominal operating frequency corresponding to a maximum rated junction temperature that comprises, among other things, "a thermal sensor control circuit [that is] operative to produce temperature data in response to the temperature signal and to provide an interrupt control signal in response to the temperature date." (Emphasis added).

Addressing the above limitation, the Office Action cites Bailey's primary temperature indicator unit 130 as being equivalent to the claimed thermal sensor control circuit" and cites Bailey's primary indicator signal 151 and column 5, lines 28-46 as teaching the provision of an interrupt control signal in response to the temperature data. The rejection is facially improper

because it fails to address claim language. As stressed above, the claimed thermal sensor control circuit is not only operative to provide an interrupt control signal but is also operative to produce temperature data. The Office Action's rejection is improper without consideration of this claim language and the rejection must be withdrawn.

Further, Applicants note that the Bailey appears to be incapable of teaching a thermal sensor control circuit as claimed by Applicants. For example, Bailey's primary temperature indicator unit 130 has only one output, the primary indicator signal 151. (Bailey, FIG. 1). The primary indicator signal 151 is asserted when the semiconductor die temperature, as indicated by the output signal of thermal sensor 134, exceeds the primary threshold level. (Col. 5, ll. 34-38). Applicants submit that a signal that is asserted when the semiconductor die temperature exceeds the primary threshold level is incapable of representing both temperature data **and** interrupt control signal. Accordingly, Bailey's primary temperature indicator unit 130 cannot be equated to Applicants' claimed thermal sensor control circuit.

Applicants further submit that the combination of Bailey and Williams also fails to teach the claimed thermal sensor control circuit that is operative to produce temperature data and to provide an interrupt control signal for the reasons identified above with respect to claim 17.

Thus, for each of the reasons stated above, the combination of Bailey and Williams fails to render obvious claim 12. Because claim 34 contains the same limitation, claim 34 is also believed to be in proper condition for allowance.

Claim 45

Claim 45 is directed to a clock control system for generating a clock signal having an operating frequency set to a first frequency corresponding to a first junction temperature comprising, among other things, "memory comprising data representing junction temperatures

over a temperature operating range with corresponding clock signal frequencies, where the data representing junction temperatures over a temperature operating range with corresponding clock signal frequencies account for a predetermined physical installation of the circuit on the die." (Emphasis added). The Office Action states that "[n]either Bailey nor Williams teaches the clock frequency accounted for a predetermined physical installation of the circuit on the die." (Page 11). Applicants agree. The Office Action, however, states that this limitation is allegedly taught in paragraph 48 of Meynard. Applicants disagree.

Meynard is directed to the adjustment of the operating speed of a computing system based on the monitoring of the activity of the processing unit in the system. (¶ 0036). Paragraph 48, in its entirety, reads as follows:

> To achieve this, there is provided a circuit which analyses the activity of the processing unit, for instance a given processor, and particularly the activity existing on particular predetermined locations of the latter. In one embodiment, the bus of the processor is precisely monitored for the purpose of determining, at every instant, the number of transactions which are pending.

Applicants submit that, unlike the Office Actions' allegation, paragraph 48 of Meynard is wholly unrelated the claimed feature of Applicants' claim 45: memory comprising data representing junction temperatures over a temperature operating range with corresponding clock signal frequencies that account for a predetermined physical installation of the circuit on the die. Instead, Meynard appears to be directed to the use of a circuit that analyses a processing unit by determining the number of pending transactions. Because counting the number of pending transactions for a processing unit is not the same as memory comprising data representing junction temperatures over a temperature operating range with corresponding clock signal frequencies that account for a predetermined physical installation of the circuit on the die, Applicants' claim 45 is believed to be in proper condition for allowance.

Dependent Claims

Each of the dependent claims (namely, claims 13, 15-16, 18-19, 37-44 and 46) add additional novel and non-obvious, patentable subject matter. The aforementioned claims further depend upon one of allowable claims 12, 17, 34, and 45 and are therefore believed to be in proper condition for allowance for at least the same reasons as articulated above.

Accordingly, Applicants respectfully submit that the claims are in condition for allowance and that a timely Notice of Allowance be issued in this case. The Examiner is invited to contact the below-listed attorney if the Examiner believes that a telephone conference will advance the prosecution of this application.

Respectfully submitted,

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